

## Insulin Imitators Polyphenols Found in Cinnamon Mimic Job of Hormone

Chemists Richard Anderson and Marilyn Polansky use high-performance liquid chromatography to identify compounds from cinnamon that improve the action of insulin.

ARS scientists and colleagues have isolated and characterized several polyphenolic polymer compounds from cinnamon bark that could one day become natural ingredients in products aimed at lowering blood sugar levels.

The newly identified chemical structures were recently named in a patent application and described in the *Journal of Agricultural and Food Chemistry*. ARS chemist Richard A. Anderson co-authored the study with colleagues at the Beltsville (Maryland) Human Nutrition Research Center and two universities.

Impaired sugar and fat metabolism is present in millions of people and may lead to type-2 diabetes and cardiovascular diseases. In test tube assays using fat cells, the polyphenolic polymers were found to increase sugar metabolism a whopping 20-fold.

Insulin is a hormone made by the pancreas to regulate sugar metabolism. In people with type-2 diabetes, either the pancreas doesn't make enough insulin or the body is unable to use it correctly. Both conditions lead to unhealthy blood levels of sugar that would otherwise provide energy to muscles.

During a decade of efforts to find natural compounds that could help maintain normal blood sugar levels, the scientists tested several components of cinnamon. The newly characterized chemical structures are closely related to a previously reported chemical derivative of cinnamon, MHCP—methylhydroxychalcone polymer. The researchers also tested scores of other plant extracts, but none displayed insulin-enhancing activity near that of cinnamon.

"These new compounds increase insulin sensitivity by activating key enzymes that stimulate insulin receptors, while inhibiting the enzymes that deactivate them," says Anderson, who is with the Nutrient Requirements and Functions Laboratory.

"Polyphenols are known for their antioxidant, anticancer, and anti-inflammatory functions, but they have not been commonly known to improve insulin function," he says. "The polyphenolic polymers in cinnamon bark have antioxidant effects, which may provide synergistic benefits to persons with various forms of diabetes."

Another recently published human

research study from the team showed considerable improvements in glucose and fat metabolism in volunteers who followed a diet that included modest amounts of table cinnamon for 40 days.

Table cinnamon is made from cinnamon bark and contains both water-soluble and fat-soluble compounds. Fat-soluble compounds may accumulate in the body if ingested over a long period. At this time, there is no data on potential effects of long-term ingestion of table cinnamon. But the newly defined chemical structures noted above are isolated from water extracts of cinnamon and appear to be nontoxic in any quantity, according to Anderson.—By **Rosalie Marion Bliss**, ARS.

*This research is part of Human Nutrition, an ARS National Program (#107) described on the World Wide Web at [www.nps.ars.usda.gov](http://www.nps.ars.usda.gov).*

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